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VIDEO-AUDIO SE[illegible]

by ROBERT T. THOMPSON
Television Engineer, Meissner Mfg. Co.
Mt. Carmel, Illinois

With the kit described, the building of a television receiver is easy.

With the power circuits completely enclosed, the safety factor is greatly raised.

THE receiver to be described was built from a kit designed to provide amateurs and experimenters with parts for a complete sound and picture receiver for the RMA Standard Television Signal. It is a superheterodyne covering the 44 to 50 and 50 to 56 megacycle channels with provision made for adding coils to a switch assembly as additional frequency assignments are put to use. Both sound and picture channels are tuned simultaneously by means of this selector switch and a small vernier condenser. There are six controls on the front of the panel.

Four additional, seldom used, knobs are brought out on the left hand side of the chassis. All of these knobs are grouped in a manner that facilitates understanding their use and makes them convenient to use. It is intended that a half wave dipole antennae be used for reception, using a transmission line with a characteristic impedance of approximately 110 ohms to connect the antennae to the receiver. A conventional antennae with a single wire lead-in *is not* recommended because such an antennae and lead-in pick up reflected signals from several directions and may cause multiple images on the cathode ray tube.

High Frequency Coil Assembly

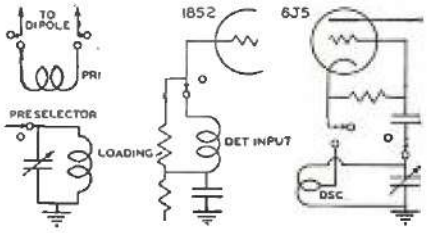
The radio frequency and oscillator coil assembly consists of a rotary channel switch assembly upon which is mounted a four-section coil for each of the two low frequency television channels. Each of these four-section coils consists of an antenna primary, a preselector, the detector input, and oscillator as shown. This arrangement permits the coupling between windings to be adjusted to optimum conditions for each television band without the compromises involved in covering a larger tuning range with one set of coils. The channel switch has four positions with two, four-section coils mounted on the switch, prewired and tested. The coil-mounting plate has provision for two additional coil assemblies which will be ample for a given locality for some time to come. Later, this can be changed.

Picture I.F. Amplifier

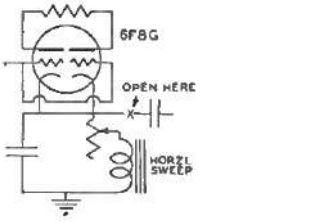
The picture i.f. amplifier makes use of capacitative coupling to facilitate adjustment of band width. Small iron cores, which tune the coils, are adjusted from the top of the can, while the degree of overcoupling is adjusted with a two-plate trimmer connected between the high potential ends of the coils. A cut-away view of such a coil, shows the simplicity of this arrangement. Plate and grid leads to the tubes are taken from the lower end of the coils and are about one and one-half inches in length. Loading resistors to obtain uniform amplification over the pass-band are connected externally to the coil assembly. A portion of the cathode resistor is not bypassed. This minimizes variation of input resistance and capacity with variation of bias. A trap for the 8.25 meg. sound i.f. frequency is connected to the grid of the first i.f. tube. This trap is also adjusted from the top of the coil can, being tuned by a small iron core.

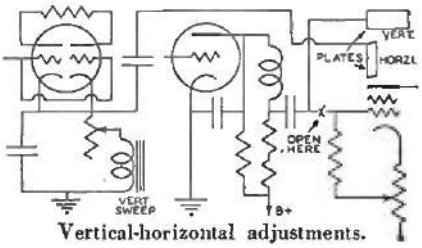
Picture I.F. Alignment

One way to adjust the i.f. is to apply a voltage from an oscillator with frequency sweep to the amplifier, stage by stage, observing the shape of the selectivity curve on a cathode ray oscillograph connected to the video detector. If the experimenter has access to such a "wobbulator" but has not a cathode ray oscillograph, the cathode ray tube of the receiver will do very well. It is only necessary to apply the vertical sawtooth voltage of

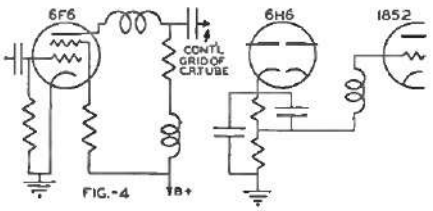


Antenna loading is adjustable.





Vertical-horizontal adjustments.

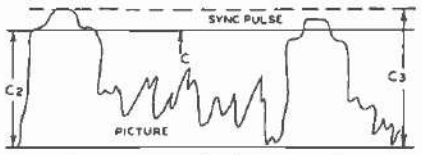


The important low-pass filters.

the sweep circuit to the horizontal deflecting plates, (allowing the horizontal sweep to go unused) and capacity-couple the plate of the video amplifier to the vertical deflecting plate. The trace will "lock-in" well enough to observe the selectivity curve.

The diagram shows how the output of the 6F6 can be applied to the vertical deflecting plate by changing the .05 mfd. 2000 volt blocking condenser from the control grid of the cathode ray tube to the vertical deflecting plate. The grid resistor to the bias supply must, of course, be left connected to the control grid.

Another method of alignment of the

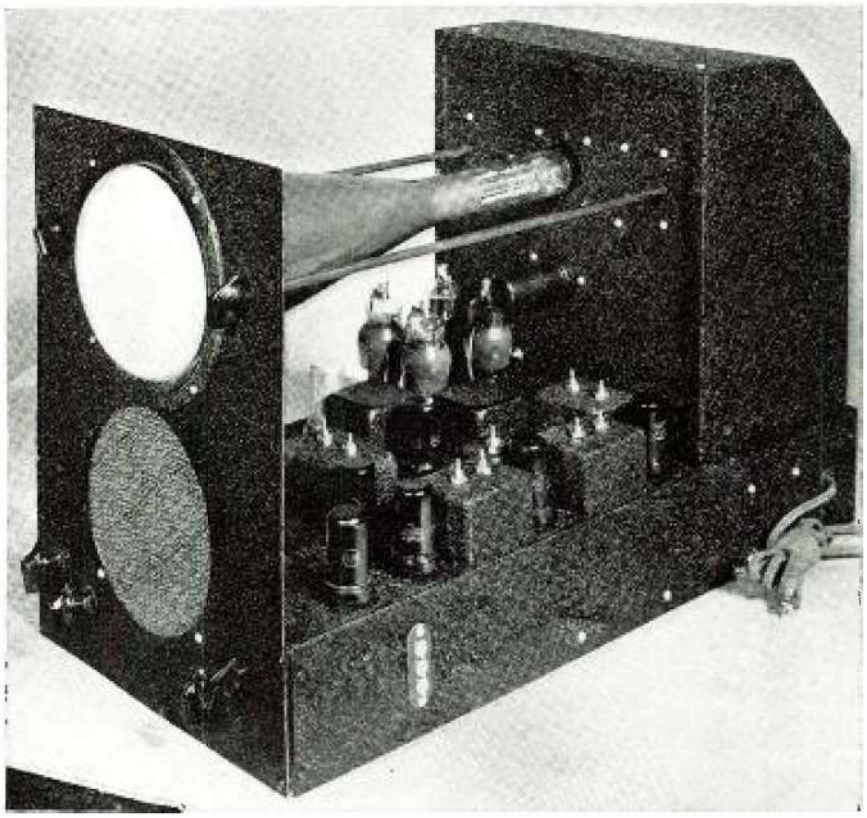


Sync-pulse and picture graph.

picture i.f. is to use a test oscillator and output meter, adjusting the transformers in order, starting with the output transformer. It may be helpful to first plot a selectivity curve for this stage alone, adjusting the capacity coupling so that two peaks will appear at approximately 10.5 and 11.5 MC respectively. Upon going to the next stage, a second curve may be made to have its two points of maximum response at about the same two frequencies. When the signal is applied to the grid of the 1852 converter, this stage is adjusted to "fill-in" the valley between the two peaks and a third curve plotted to show the overall i.f. selectivity. The trap for the *sound* i.f. frequency may be adjusted *before* tuning the input picture transformer, but should be "touched up" *after* the input stage has been aligned.

This alignment procedure will give an overall i.f. sensitivity on the order of 500 microvolts for optimum contrast on the cathode ray screen. For amateurs living outside the "service area" of a television transmitter it is possible, because of the flexibility of the i.f. amplifier, to adjust the band pass characteristic to any reasonable combination of selectivity and gain. Thus, a distance handicap can be compensated for, to some extent, though naturally at sacrifice of picture detail. Similarly, those who are fortunate enough to have a signal input of 4000 or 5000 microvolts may reduce the sensitivity and improve detail, as dictated by their particular locations.

The second detector consists of one diode of a 6H6. The low pass filter which comprises the load of this tube is mounted in the high voltage compartment directly below the horizontally placed 6F6. An inspection of the illustration of the complete receiver will show the advantage of this particular arrangement. It will be noted that the placement of the 6H6 and the 6F6 permit short, direct leads for both the video frequencies and the synchronizing pulses, which are taken from the same (6H6) tube.



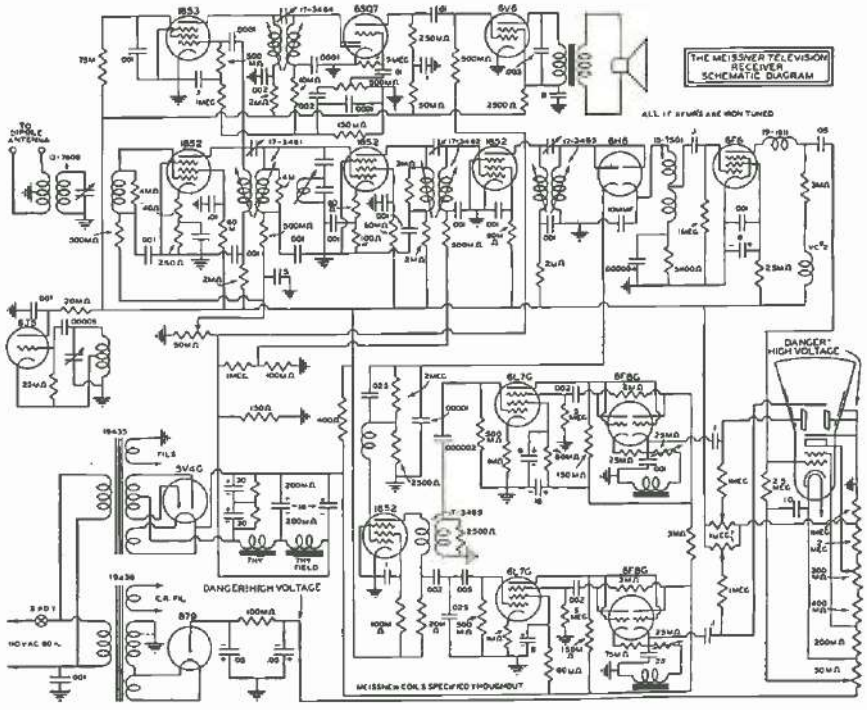
What the completed sound and sight television receiver will look like.

Video Amplifier

The video amplifier consists of a 6F6 tube in a circuit which is a combination of series and shunt compensation to give a flat frequency response up to 3 mc. In the video amplifier the experimenter may raise or lower the gain, if so inclined. This flexibility is desirable since the frequency response of the video amplifier should be comparable to the band pass characteristic of the picture i.f. amplifier system.

The videotron is operated with the cathode and control grid about 2000 volts negative with respect to chassis. For this reason, a rated 2000 volt blocking condenser *must* be used between the cathode ray control grid

(*Build further on page* 56)



were only coming in r5 and r6.

Looks like W6GRL and W6CXW are battling to the finish on the DX test, at the time this is written. The West Coast has had a rather tough time with ten meters during the DX CW tests although 40 meters is unusually good this year. 20 meters is about the same as last year.

W6BPP at *Radio Supply Company*, Los Angeles, has his 2d class telephone ticket.

During the DX CW contest the EC boys behaved well, and instead of riding in on top of the DX stations, kept approximately 5 KCs on one side. This made DXing this year far easier than last, because last year the EC boys would dead beat with the foreign stations unless they all happened to quit calling at once, the foreign station would be wiped out.

Once in a while someone has a crystal right on the foreign station and, of course, he cannot shift that, but that is only one or two stations in place of the large number before.

Another interesting thing about the DX test this year is that a great number of the stations used two receivers and in that way could keep track of both the DX station, and the United States Station being worked.

W6CHU is very active in the Bell Radio Club, and recently arranged for a safety talk at the club.

It is certainly good to see Wally Gee back on the air again, working DX with his famous W6EGH.

W6GRX, as usual, will have a high score in the DX test this year.

W6MHH worked Sumatra on 20 meters.

W6AM had a good look at the wonderful ham shack of W6KW in San Diego. W6KW is making a one kilowatt phone and CW rig for our old friend Fred Ferreira at Tijuana.

W6FZL, one time high man in the L. A. Section DX contest, is going to have a good score again this year.

Our old friend, W6KRI, is active on the 10 meter band.

W6QUT, "Amos" of "Amos and Andy," has gone to Palm Springs. When he comes back a new radio room will be completely installed, together with rotary beam directly overhead, RME-69, DB-20, 510X, and a large transmitter.

W6GCT, who worked so many Europeans in last year's DX test in San Diego, was caught in the midst of rebuilding, and was unable to get on the air this year.

W6CGX is doing good work on 20 meters. We all remember his marvelous work in QSOing 50 countries in the 10 meter phone tests last year.

W6NSY is training a junior op.

W6GWY sticks to the ranks of the CW hounds.

The big beams of W6LYM are working Europe in great shape these days on 20 meters.

W5CHY comes in fine on 5 ms, at sea level, Catalina Island. This is about 40 miles away, and about approximately 800 feet below the horizon.

Honolulu, and the East Coast come in well on 60 (yah mean 60??) meter phone these days.

One of the San Diego Amateurs worked New Zealand on his 12 watt flea powered transmitter. This was on 75 meter phone, and speaks well for the San Diegan's antenna system!

W6TT, Elvin Feige, puts in a marvelous 20 meter signal here in Long Beach, at a distance of 400 miles.

W6RO has two 90 foot telephone poles besides the 90 foot tower made by W6DDS, and the 9-90 gang.

The Southwest Experimental Radio Amateur Association (Bell Club) held their annual banquet on March 10.

W7RT's snappy fist sounds good over the air these days. You may remember John as the chap who spent nine months in the Alaskan interior, and contacted the Russian Scientists on the ice floe.

XE2N seems to be on all bands. No doubt he shifts from 10 to 20 to 40 meters, but it sounds as if he is always on.

W1JPE is most consistent of the Hartford Headquarters Gang outside of W1AW.

We have noticed out on the West Coast that unusual DX comes in during, or just after a rainstorm. This is due partly, no doubt, to the power noises being drowned out, but partly due to the low pressure area coming in from certain directions, thus clearing up the air.

California's Mission Trail net has been assisting the American Legion in organizing an emergency system. The American Legion Posts of each city are furnishing funds.

Some of the stations coming in good during the DX test include the following: On 7 megacycles — YS2LR, J8CB, VM8AB, F8CQ, ON4MW.

Some of those coming in at L. A. on 20 meters, include: VP2LC, SM7MU, ON4NW, SP1MX, PY2BJ, OZ2M, OZ9Q, ES5C, ES5D, G6MC, G2MI, VO1D, PAØQQ, HH2MC, PK1WA, PK4KS, G6WY, F8KJ, and DJ6KHW.

W9LME tells that one day an SWL came to him and asked, "Who is this guy CQ that everyone calls? I can never tune him in!"

W9VWO has had an amateur license for four years and hasn't been on the air yet!

In his excitement over the birth of a YL junior op. what ham put a 160M crystal in his rig and tried to tune to 20 meters? How could he double to 20 meters with one doubler, push-pull buffer, and push-pull final?

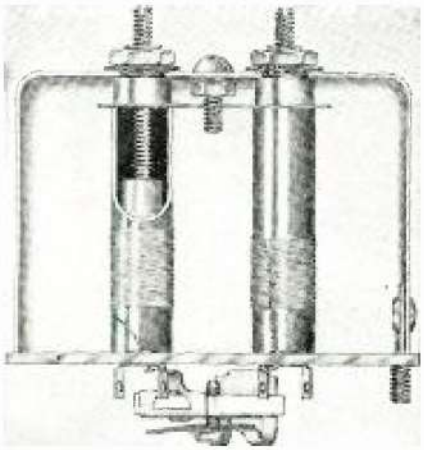
Because his '36 call book listed the call and name differently, W9YTM thought the present W9LME a "bootie." No hard feelings after all was straightened out, though!

-30-

Build a Tele-Receiver

(*Continued from page* 13)

and the plate of the 6F6 video amplifier. Also, the condenser from the cathode ray control grid to its cathode must be insulated for 2000 volts to ground. The focusing and bias potentiometers are part of the high voltage bleeder and are mounted on bakelite sub-panels and supplied with insulated extension shafts. The videotron tube socket is mounted in a manner that



Internal I.F. construction.

permits a few degrees rotation about its long axis so that the edges of the picture may be made truly vertical and horizontal. Provision is also made at the tube socket to accommodate the commercial variation in the overall length of the tubes.

Synchronizing Pulse Clipper

Returning to the 6H6, the synchronizing circuit begins with the other diode plate, the cathode of which is

connected to a resistance capacity network.

Synchronizing pulses are separated from each other in the "synchronizing separator coils" in the plate circuit of the 1852 synchronizing separator tube. Horizontal synchronizing pulses appear at the secondary coil while vertical synchronizing pulses appear across a condenser in the plate circuit of the 1852 tube.

The sweep circuits are of the multivibrator type and are easily adjusted for sweep amplitude and frequency. The separated synchronizing pulses are applied to the control grids of the 6L7G's through suitable coupling condensers.

The sound channel consists of an 1853 i.f. amplifier, a 6SQ7 second detector, first audio and A.V.C., a 6V6 output tube, and a 6-inch electrodynamic speaker, the field of which is a part of the low voltage filter. The same type of tuning and capacity coupling system used in the picture i.f. transformers is employed, although, of course, the pass band of this stage is far sharper and the amplification higher than in a picture i.f. stage. The sound i.f. should, however, be broad enough so that some adjustment of the oscillator frequency may be made (for best picture) without noticeably affecting the sound reproduction. The frequency to which the sound i.f. is tuned is 8.25 mc. —30—

Within Earshot
(*Continued from page 4*)

out that brain child of yours.

We urge that you do not hold off buying that radio set until that time.

* * *

WE wrote to many persons asking their opinions on television. Some of the replies we received follow:

"I am vitally interested in the development and perfection of Television. It will accomplish much for the people of the United States in the way of entertainment, education, employment, and public enlightenment of important questions. Radio has filled a long existing need and brings a closer relationship between people and leaders of industry, government and education. Television will bring a still closer contact between those who must carry their message to the public, whether it be through entertainment, advertising or commercial purposes, or in political and public matters. I believe the surface has only been touched and the years to come will bring to us all a communication system that many, who are today engaged in the development of the industry, believe impossible. I heartily congratulate those who have pioneered this industry, and to those working for perfection I give my assurance of cooperation and support in any manner where I may be able to aid in the development of this great industry."

Culbert L. Olsen,
Governor, State of California.

Dear Sirs:
It is indeed encouraging to know that the practical application of television is about to be realized in America. In my opinion, television will usher in a new era of entertainment and education that will be of immeasurable value to our people. In addition, it will provide a new field of employment as well as furnish a further impetus to the march of progress in this country.

Sincerely yours,
Edward J. Kelly,
Mayor, City of Chicago.

Dear Sirs:
The study of music is only one way in which television may be used to enrich the lives of all the people. Carry this example over into the fields of art, of science, of sport, of entertainment, of diplomacy! There are no limits which cannot be reached, and no promise which cannot be fulfilled by the miracle of the future—Television!

Sincerely,
Leland W. Cutler,
President, Golden Gate International Exposition.

Dear Sir:
Television will open new fields of entertainment which stagger the imagination when viewed in the light of new accepted standards.

Naturally, it is in its infancy. The present development may be compared to the commercial broadcasting of 1922—but remember the pleasure we derived then from the broadcasting of that era.

In those days there were hundreds of thousands of experimenters playing with the problems of the newly developed art. How much more has Television to offer the experimenter of today than the simple circuits of yesterday.

Very truly yours,
Vince Rockey,
Vice-President, Meissner Mfg. Co.

To these gentlemen, as well as the others who so kindly answered our inquiries, we offer our grateful thanks. We received many more expressions, but space requirements prohibit their inclusion in the column.

* * *

A GREAT many of those interested in radio are at the same time followers of the art of Daguerre. Right across the isle from our office there has been a lot of hustle and bustle. Curious, we finally cornered Andy Hecht, Managing Editor of *Popular Photography*, our sister publication, and asked what was going on. He threw over the dummy of the next issue of his publication for our inspection. It is practically a complete directory of photography. We never knew there was so much to that interesting field. The magazine contains a listing of cameras, projectors, film, lights, enlargers, developing chemicals, printing papers, bromide papers, etc., etc. Andy told us that it was a swell catalog of modern photographic equipment. We pass this information on to you. Make sure that you won't miss this great May issue of *Pop. Photo.*

* * *

WE had occasion to talk to OQ5AE who paid us a visit. When he did he was over 10,000 miles away from his home in the Belgian Congo. He was on his way back. Instead of crude hand run equipment which he had last year, he goes fully fitted out with gasoline driven generators and fine equipment. Among the very many interesting things that he told us was the fact that he has to go over 800 miles to get his mail. We were exceptionally fortunate in making an exclusive contract with OQ5AE to publish his experiences in the forthcoming issues. He has promised us thrilling stories of his ham work in one of the most out-of-the-world QRA's.

* * *

WHEN the broadcasting industry was in its infancy, not so very long ago, the very first listening audience was composed almost entirely of experimenters who built their own receivers. Most of the information for the building of these instruments was furnished by the manufacturers alike to all. Today, the one thing that is holding back television most, is the lack of a large number of "viewers." In the final analysis this audience will come via the home-constructors and experimenters who will lead the expected millions of every-day listeners and viewers into the field.

As in the past, it will be the experimenter with his advanced knowledge who will pioneer the general television audience. A large number of these pioneers already exist in the West where Don Lee made plans of receivers available to all simultaneously with the erection of his telecasting stations.

While there is much to be said on the side of manufacturers in keeping their circuits secret, and thus attempting to maintain superiority over their competitors, the eventual universal acceptance of television rests entirely with the public. What better way is there to get that public "hot" for television than to "let them in on the inside" and give the many who are anxious to build television receivers, the impetus they need with complete information? KAK. —30—